

Session Management with SessionAuth

From Simple Concepts to Working Code

- Sessions
 - The Problem: HTTP is Stateless
 - What Are Sessions?
 - How Sessions Work: Step by Step
- Session PHP Example (session/basic)
 - index.php
 - login.php
 - check.php (See What's Stored)
 - welcome.php
 - logout.php (Destroy Session)
- Rewrite using the SessionAuth class (session/sessionauth)
 - Problems with Basic Approach
 - Solution: SessionAuth Class
 - SessionAuth Benefits
 - Code Comparison: Login
 - Code Comparison: Authentication
 - Hands-On Exercise
- Other Session Related Topics
 - Session vs Cookies
 - What you could add to SessionAuth (Optional)
 - Common Session Problems & Solutions
 - Session Best Practices
 - Real-World Applications
- Key Takeaways
 - Sessions Enable
 - Security Features

Sessions

- 🤔 What are sessions and why do we need them?
- 🔧 How PHP sessions work step-by-step
- 💻 Building a simple session system
- 🛡️ Session security best practices
- 🎯 Hands-on coding examples

The Problem: HTTP is Stateless

User visits page 1: "Hi, I'm John"
User visits page 2: "Who are you again?" 🧑

Each request is independent

- Server forgets everything after each request
- No memory of previous interactions
- How do we remember users across pages?

Solution: Sessions!

What Are Sessions?

Sessions = Server's memory of your visit

```
// When you login:
$_SESSION['username'] = 'john';
$_SESSION['logged_in'] = true;

// Later, on any page:
echo "Welcome back, " . $_SESSION['username'];
// Outputs: Welcome back, john
```

Key Concept

- Server stores your data
- Browser gets a "ticket number" (session ID)
- Browser shows ticket, server finds your data

How Sessions Work: Step by Step

Step 1: Start Session

```
session_start(); // Must be first line!
```

Step 2: Store Data

```
$_SESSION['user_id'] = 123;  
$_SESSION['username'] = 'john';
```

Step 3: PHP Magic

- PHP creates unique session ID: for example, `abc123def456`
- PHP sends cookie to browser: `PHPSESSID=abc123def456`
- PHP saves your data on the server

Step 4: Remember Later

- Browser sends cookie to PHP with every request
- Using the cookie, PHP loads your data automatically
- `$_SESSION` array is ready to use!

Session PHP Example (session/basic)

In the session/basic directory, run `php -S localhost:8000` to start PHP server.

Open a browser, and access the PHP server at <http://localhost:8000>.

index.php

When users access the PHP server, `index.php` is accessed automatically.

1. It starts the session.

```
<?php  
session_start();  
?>
```

2. It displays information.

```
<h1>Session Demo – Super Simple</h1>  
...  
<h2>Try it:</h2>  
<p><a href="login.php">1. Login (john/secret)</a></p>  
...  
<p><a href="logout.php">5. Logout</a></p>
```

3. It reads the `$_SESSION` to check the user is logged in or not.

```
<?php if (isset($_SESSION['logged_in']) && $_SESSION['logged_in']): ?>
    <h3>Current Status: Logged in as <?= $_SESSION['username'] ?> (ID: <?= $_SESSION['user_id'] ?>)</h3>
<?php else: ?>
    <h3>Current Status: Not logged in</h3>
<?php endif; ?>
```

- `isset($_SESSION['logged_in'])` → a flag that there is a variable `$_SESSION['logged_in']`.
- `$_SESSION['logged_in']` → a flag that should have been set at login (true if user is authenticated).
- It displays the `$_SESSION['username']` and `$_SESSION['user_id']` when the user is logged in.

login.php

```
<?php
session_start();

if ($_POST['username'] == 'john' && $_POST['password'] == 'secret') {
    $_SESSION['user_id'] = 1;
    $_SESSION['username'] = 'john';
    $_SESSION['logged_in'] = true;
    header('Location: welcome.php');
    exit;
}
?>
```

- In the login.php, this is the form that users can use to give user name and password.

```
<form method="post">  
  Username: <input type="text" name="username"><br>  
  Password: <input type="password" name="password"><br>  
    <input type="submit" value="Login">  
</form>
```

- When users give correct username/password, session variables are set, including `$_SESSION['logged_in']`.

```
<?php
session_start();



if ($_POST['username'] == 'john' && $_POST['password'] == 'secret') {
    $_SESSION['user_id'] = 1;
    $_SESSION['username'] = 'john';
    $_SESSION['logged_in'] = true;
    header('Location: welcome.php');
    exit;
}
?>
```

check.php (See What's Stored)

- Users can access this page only when they are logged in the session is created.
- The session data is accessible with the `session_id()` function.

```
<p><strong>Session ID:</strong> <?= session_id() ?></p>

<p><strong>What's in $_SESSION:</strong></p>
<pre><?php print_r($_SESSION); ?></pre>

<?php if ($_SESSION['logged_in']): ?>
  <p>Status:  Logged in as <?= $_SESSION['username'] ?></p>
<?php else: ?>
  <p>Status:  Not logged in</p>
<?php endif; ?>
```

welcome.php

Magic: This page "knows" who you are!

```
<?php
session_start();

// Check if user is logged in
if (!$_SESSION['logged_in']) {
    header('Location: login.php'); // Redirect to login
    exit;
}
?>

<h1>Welcome!</h1>
<p>Hello, <?= $_SESSION['username'] ?>!</p>
<p>You are logged in.</p>

<a href="logout.php">Logout</a>
```

logout.php (Destroy Session)

```
<?php
session_start();
session_destroy(); // Forget everything
?>

<h1>Logged Out</h1>
<p>Your session has been destroyed.</p>
<a href="login.php">Login Again</a>
```


- `session_destroy()` deletes all session data
- Server forgets who you are
- Protected pages will redirect to login

Rewrite using the SessionAuth class (session/sessionauth)

Problems with Basic Approach

Code Duplication

```
// Must copy this to every protected page
session_start();
if (!$_SESSION['logged_in']) {
    header('Location: login.php');
    exit;
}
```

Security Issues

- No session regeneration (session fixation attacks)
- Incomplete logout (session data may remain)
- Inconsistent authentication checks

Solution: SessionAuth Class

Object-Oriented Approach = Better Code + Better Security

```
class SessionAuth {  
    public function __construct() {  
        if (session_status() === PHP_SESSION_NONE) {  
            session_start();  
        }  
    }  
  
    public function login_user($user) {  
        $_SESSION['user_id'] = $user['id'];  
        $_SESSION['username'] = $user['username'];  
        $_SESSION['logged_in'] = true;  
  
        // Security: Prevent session fixation  
        session_regenerate_id(true);  
    }  
}
```

```
public function logout_user() {  
    session_unset();    // Clear data  
    session_destroy(); // Destroy session  
}  
  
public function is_logged_in() {  
    return isset($_SESSION['logged_in']) && $_SESSION['logged_in'] === true;  
}
```

- These functions require the user to be logged in.

```
public function get_user() {
    if ($this->is_logged_in()) {
        return [
            'id' => $_SESSION['user_id'],
            'username' => $_SESSION['username']
        ];
    }
    return null;
}

public function require_auth($login_url = 'login.php') {
    if (!$this->is_logged_in()) {
        header("Location: $login_url");
        exit;
    }
}
}
```

SessionAuth Benefits

Clean Code

```
// Old way (repeated everywhere)
session_start();
if (!$_SESSION['logged_in']) {
    header('Location: login.php');
    exit;
}
```

```
// New way (one line)
$auth = new SessionAuth();
$auth->require_auth();
```


Built-in Security

- Automatic session regeneration on login
- Complete session cleanup on logout
- Consistent authentication across all pages

Code Comparison: Login

Basic Approach (Security Risk!)

```
if ($username === 'john' && $password === 'secret') {  
    $_SESSION['user_id'] = 1;  
    $_SESSION['username'] = 'john';  
    $_SESSION['logged_in'] = true;  
    // No session regeneration! 🚩  
}
```


Session Fixation Attack

Problem: Attacker sets victim's session ID, waits for login

```
// Basic approach – VULNERABLE  
$_SESSION['logged_in'] = true;  
// Session ID stays the same! 🚩
```

Solution: SessionAuth regenerates the session ID

SessionAuth Approach (Secure!)

```
if ($username === 'john' && $password === 'secret') {  
    $user_data = ['id' => 1, 'username' => 'john'];  
    $auth->login_user($user_data); // Includes security features   
}
```

SessionAuth automatically prevents session fixation attacks!

Code Comparison: Authentication

Basic Approach (Must Repeat)

```
// Copy this to EVERY protected page
session_start();
if (!$_SESSION['logged_in']) {
    header('Location: login.php');
    exit;
}
// Easy to forget! 😞
```

SessionAuth Approach (DRY Principle)

```
// One line protects any page  
$auth = new SessionAuth();  
$auth->require_auth(); // Clean and consistent! 😊
```

DRY = Don't Repeat Yourself

Hands-On Exercise

Try Both Approaches

Basic Version: `/session/basic/`

- Simple but has security issues
- Code duplication everywhere
- Manual session management

SessionAuth Version: `/session/sessionauth/`

- Secure and professional
- Clean, reusable code
- Automatic security features

Other Session Related Topics

Session vs Cookies

Method	Server Storage	Client Storage	Security	Expiration
Sessions	✓ Yes	Session ID only	✓ High	Server controls
Cookies	✗ No	✓ Full data	⚠ Medium	Client controls

Sessions are most secure for sensitive data!

What you could add to SessionAuth (Optional)

```
// Password hashing
public function verify_password($input, $hash) {
    return password_verify($input, $hash);
}

// Session timeout
public function check_timeout($minutes = 30) {
    // Implementation here
}
```

```
// Remember me functionality
public function set_remember_token($user_id) {
    // Implementation here
}

// Role-based access
public function require_role($role) {
    // Implementation here
}
```

Common Session Problems & Solutions

Problem 1: Session Not Starting

```
// ❌ Wrong – session already started elsewhere
session_start();

// ✅ Correct – check first
if (session_status() === PHP_SESSION_NONE) {
    session_start();
}
```

Problem 2: Headers Already Sent

```
// ❌ Wrong – output before session_start()
echo "Hello";
session_start(); // Error!

// ✅ Correct – session_start() first
session_start();
echo "Hello";
```

Problem 3: Session Data Lost

```
// ❌ Wrong – forgot to start session
$_SESSION['user'] = 'john'; // Won't work!

// ✅ Correct – start session first
session_start();
$_SESSION['user'] = 'john';
```

Session Best Practices

1. Always Check Session Status

```
public function __construct() {  
    if (session_status() === PHP_SESSION_NONE) {  
        session_start();  
    }  
}
```

2. Secure Session Configuration

```
// In your main configuration file  
ini_set('session.cookie_httponly', 1); // Prevent JavaScript access  
ini_set('session.cookie_secure', 1);   // HTTPS only  
ini_set('session.use_strict_mode', 1); // Strict session ID generation
```

3. Clean Session Data

```
public function logout_user() {  
    session_unset(); // Clear all $_SESSION data  
    session_destroy(); // Destroy the session file  
  
    // Optional: Clear the session cookie  
    if (isset($_COOKIE[session_name()])) {  
        setcookie(session_name(), '', time() - 3600, '/');  
    }  
}
```

Real-World Applications

E-commerce Sites

- Shopping cart contents
- User preferences
- Login status

Social Media

- User identity
- Privacy settings
- Recent activity

Banking Applications

- Secure authentication
- Transaction state
- Security timeouts

Your Projects

- User management systems
- Admin panels
- Any application requiring login

Key Takeaways

Sessions Enable

1. **User Authentication** - Remember who's logged in
2. **State Management** - Maintain data across requests
3. **Security** - Server-side data storage
4. **User Experience** - No need to login repeatedly

Security Features

- **Session ID regeneration** prevents fixation attacks
- **Timeout handling** limits exposure window
- **Activity tracking** enables idle detection
- **Proper cleanup** prevents data leaks